T2-PAC, T2-NAC
T2-PHP, T2-NHP
LEGACY™ SERIES THERMOSTATS

Installation Instructions

A07047
Legacy Series
Programmable Thermostat

A07046
Legacy Series
Non–Programmable Thermostat

NOTE: Read the entire instruction manual before starting the installation

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SAFETY CONSIDERATIONS

Read and follow manufacturer instructions carefully. Follow all local electrical codes during installation. All wiring must conform to local and national electrical codes. Improper wiring or installation may damage thermostat.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the equipment and in the instruction manual, be alert to the potential for personal injury.

Understand the signal words **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety-alert symbol. **DANGER** identifies the most serious hazards which will result in severe personal injury or death. **WARNING**

signifies a hazard which could result in personal injury or death. **CAUTION** is used to identify unsafe practices which may result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which will result in enhanced installation, reliability, or operation.

INTRODUCTION

Bryant's Legacy™ Series programmable thermostats are wall-mounted, low-voltage thermostats which maintain room temperature by controlling the operation of a heating and/or air conditioning system. Both heat pump and air conditioner models are available, each in programmable and non-programmable versions. A variety of features are provided including battery operation, separate heating and cooling setpoints, auto changeover, keypad lockout, backlighting, and built-in installer test. Programming features include 7-day (all days the same) and 5/2 (Mon-Fri and Sat-Sun) with 2 or 4 periods per day.

This Installation Instruction covers installation, configuration, and startup of all four versions of the Legacy Series line of thermostats. For operational details, consult the Owner's Manual for the specific thermostat you are installing.

INSTALLATION CONSIDERATIONS

Models

There are four models in the Legacy Series: programmable and non-programmable, AC and HP. Models T2-PAC and T2-NAC are designed for AC systems, controlling one stage of cooling and one stage of heating. They will not operate a heat pump. Models T2-PHP and T2-NHP are designed for HP systems, controlling one stage of cooling and two stages of heating. They can be converted to AC operation. Select the appropriate model for the intended application.

Power

All Legacy Series models are dual powered. They can operate from batteries or 24VAC power. Operation from 24VAC is preferred if available. Battery operation is used when there are not enough wires to support 24VAC operation or when “armchair programming” is desired. For an AC system, 5 wires are needed for 24VAC operation and 4 wires for battery operation. For a HP system, 6 wires are needed for 24VAC operation and 5 wires are sufficient for battery operation. For heat only operation with batteries, only 2 wires are required. When battery operation is used, the C terminal does not need to be connected.

Provision is also made for separate heating and cooling transformers via separable Rc and Rh terminals which are connected via a factory-installed jumper wire.

INSTALLATION

Step 1 — Thermostat Location

- Approximately 5 ft (1.5m) from floor.
- Close to or in a frequently used room, preferably on an inside partitioning wall.
- On a section of wall without pipes or duct work.

Thermostat should NOT be mounted

- Close to a window, on an outside wall, or next to a door leading to the outside.
- Exposed to direct light or heat from the sun, a lamp, fireplace, or other temperature-radiating objects which could cause a false reading.
- Close to or in direct airflow from supply registers and return-air registers.

- In areas with poor air circulation, such as behind a door or in an alcove.

Step 2 — Install Thermostat

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing thermostat, turn off all power to equipment. There may be more than 1 power disconnect.

1. Turn OFF all power to unit.
2. If an existing thermostat is being replaced:
   a. Remove existing thermostat from wall.
   b. Disconnect wires from existing thermostat, 1 at a time. Be careful not to allow wires to fall back into the wall.
   c. As each wire is disconnected, record wire color and terminal marking.
   d. Discard or recycle old thermostat.

⚠ CAUTION

ENVIRONMENTAL HAZARD

Failure to follow this caution may result in environmental damage.

Mercury is a hazardous waste. Federal regulations require that Mercury be disposed of properly.

3. Open thermostat (mounting base) to expose mounting holes. The base can be removed to simplify mounting. Press the thumb release at the top of the thermostat and snap apart carefully to separate mounting base from remainder of thermostat.
4. Route thermostat wires through large hole in mounting base. Level mounting base against wall (for aesthetic value only—thermostat need not be level for proper operation) and mark wall through 2 mounting holes. See Fig. 1.

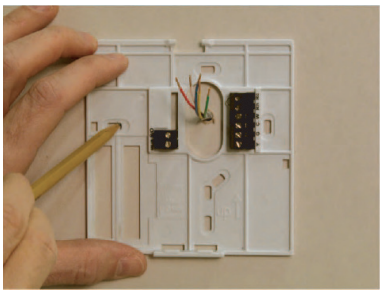

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Fig. 1 - Backplate Mounting

5. Drill two 3/16-in. mounting holes in wall where marked.
6. Secure mounting base to wall with 2 anchors and screws provided (additional anchoring holes available for more secure mounting if needed) making sure all wires extend through hole in mounting base.
7. Adjust length and routing of each wire to reach proper terminal and connector block on mounting base with 1/4 in. of extra wire. Strip only 1/4 in. of insulation from each wire to prevent adjacent wires from shorting together when connected. See Fig. 2.

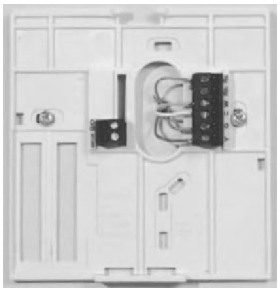

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Fig. 2 - Secure Wires to Terminal Strip

8. Match and connect equipment wires to proper terminals of the connector blocks (see Fig. 3). If there are separate 24VAC transformers, one in the indoor unit and one in the outdoor unit, connect the common of each to the C terminal. Remove factory-installed jumper wire from Rc and Rh terminals. Connect the R from the indoor unit to the Rh terminal. Connect the R from the outdoor unit to the Rc terminal. Then the W signal is taken from the Rh power and the Y, G and O signals are taken from the Rc power.

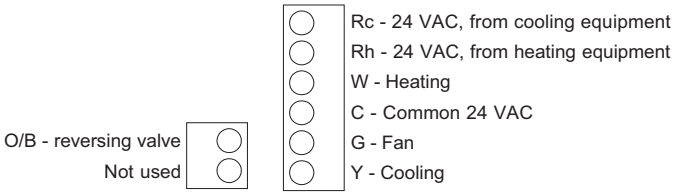

Fig. 3 – Terminal Designations

⚠ CAUTION

ELECTRICAL OPERATION HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Improper wiring or installation may damage the thermostat. Check to make sure wiring is correct before proceeding with installation or turning on unit.

9. Push any excess wire into wall and against mounting base. Seal hole in wall to prevent air leaks. Leaks can affect operation.
10. Snap case back together. Attach thermostat to backplate by inserting tab on bottom edge and hinging up until top snap secures. See Fig. 4

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Fig. 4 - Attach Thermostat to Backplate

11. Close thermostat assembly making sure pins on back of circuit board align with sockets in connector.
12. Turn ON power to unit.

When power is applied, all display icons are lit for 2 seconds to test the display. Following this, the equipment type for which the thermostat is configured is displayed for an additional 2 seconds. It will be one of HP, AC, H, PH, PC or C (see explanation under Step 3, Option 01 below). A HP thermostat configured to operate an AC (see Option 1 below) will display AC. An AC thermostat cannot display HP.

NOTE: If a common wire has not been connected, two AA batteries must be used to power the thermostat.

Step 3 — Set Thermostat Configuration

Configuration options enable the installer to configure the thermostat for a particular installation. Most are not presented to the homeowner and therefore must be properly

set by the installer. (Only those marked with an asterisk * below are available to the homeowner.) Following is a list of the options available, an explanation of their function, and their factory default settings. Not all numbers are used in the Legacy Series because not all options are available in this series – and numbering is consistent across the T1, T2, and T6 thermostat lines.

Configuration Options – Summary:

Option 01 – Equipment type
Option 03* – Fahrenheit/Centigrade
Option 04 – Fan (G) on with W output
Option 07 – Zoning
Option 10 – Reversing valve
Option 11 – Minimum deadband between heating and cooling setpoints
Option 12 – Smart Recovery (programmable models only)
Option 13 – Room air temperature offset adjustment
Option 15 – Auto Changeover availability
Option 16 – Maximum cycles per hour
Option 17 – Time between equipment stages
Option 18* – Continuous backlighting
Option 21* – Keypad lockout
Option 24* – Programmable/non-programmable (programmable models only)
Option 25* – Number of programmable periods per day
Option 26 – Minimum cooling setpoint
Option 27 – Maximum heating setpoint
Option 99 – Reset to factory defaults

Those options marked with an asterisk are also adjustable by the homeowner. See Owner's Manual for further information.

To Enter the Configuration Mode:

Press and hold the FAN key for about 10 seconds until the display changes so that only two pairs of digits are showing. The left (programmable version) or the large upper (non-programmable version) display shows the configuration number and the right (programmable version) or small lower (non-programmable version) shows the configuration setting. Configuration number will be flashing which means it can be adjusted using the UP and DOWN keys. To cause the opposite pair to flash (to be adjustable), press the MODE key. Successive presses of the MODE key alternate between the configuration number and the configuration setting. To exit the configuration mode, press the FAN key. If no key is pressed for 3 minutes, the configuration mode will automatically exit, returning the thermostat to normal operation.

Configuration Options - Selection:

Option 01 - Equipment type

Selections: with HP thermostat: HP, AC, H, C, PH or PC
with AC thermostat: AC, H, C or PC

PC and PH are only available on non-programmable models.

Meanings:

PC or PH selects PTAC units (Packaged Terminal Air Conditioners) which are used in motel rooms and other rented spaces. When this option is selected, the display shows only the setpoint, not the room temperature. Also the compressor timeguard is disabled, allowing the compressor to turn on immediately when a demand is established.

HP or PH controls 1 speed heat pump with 1 stage of aux heat.

AC or PC controls 1 speed air conditioner with 1 stage of heat.

H operates a heat only system: furnace or fan coil only; no outdoor unit.

C operates a cool only system: outdoor AC unit with an indoor fan coil; no strip heater support.

Note that this option allows a HP thermostat to be converted to control an AC system.

Option 03 - Fahrenheit/Centigrade

Selections:

F = Fahrenheit — Default is Fahrenheit.

C = Centigrade.

Selects temperature measurement units.

Option 04 - Fan (G) ON with W output

Selections:

OF = G not energized with W — This is default.

ON = G energized with W.

This selection determines whether the fan (G) is to be ON or OFF when the W (furnace or strip heat) is ON. Furnaces and fan coils which manage their own blowers do not require a separate G signal. Some auxiliary heaters require a separate G signal to operate the blower when W is applied.

Option 07 - Zoning

Selections:

OF = non-zoned system — This is default.

ON = zoned system.

ON disables thermostat's internal timers which are not needed with zoning system controls. Must be set to OF for non-zoned systems.

Option 10 - Reversing valve

This selection is only available on heat pump systems. “O” terminal can be configured to be energized in either heating mode or in cooling mode, depending on heat pump operation. “O” is used to describe a heat pump system that energizes its reversing valve in cooling. “B” is used to describe a heat pump system that energizeS its reversing valve in heating.

H — Reversing valve output (O/W2/B) is energized when HEAT mode is selected.

C — Reversing valve output (O/W2/B) is energized when COOL mode is selected.

Default is C.

Option 11 - Minimum Deadband Between Heating And Cooling

Selections:

01 through 06 — Default is 02.

Sets the minimum allowable number of degrees between heating and cooling setpoints. One setpoint will “push” the other to maintain this difference.

Option 12 - Smart Recovery (programmable model only)

Selections:

OF, 30, 60, 90 — Default is 90.

Smart Recovery OF means setpoints change immediately at a program schedule change. Thirty, 60, or 90 selects the number of minutes recovery starts before programmed recovery time. Recovery takes place smoothly during the selected recovery time, ending at the recovery time and temperature which is programmed. If the setpoint is changed during smart recovery, the smart recovery is cancelled and the new setpoint is effective immediately. Not available with non-programmable thermostats.

Option 13 - Room Air Temperature Offset

Selections:

-5 to 5° F — Default is 0.

This option selects the number of degrees F to be added to the displayed temperature to calibrate or deliberately miscalibrate the measured room temperature.

Option 15 - Auto Changeover Availability

Selections:

ON — This is default.

OF

ON allows automatic changeover between heating and cooling as demand requires. OF maintains either heating or cooling mode only. Auto changeover is not available when PH, PC, H or C is selected under Option 1.

Option 16 - Maximum Cycles Per Hour

Selections:

2, 4, or 6 — Default is 4.

The maximum cycle rate is limited by internal timers to the selected number of cycles per hour. Selection of a higher number causes faster cycling resulting in more constant room temperature.

Option 17 - Minimum Time Between Equipment Stages

Selections:

10, 15, 20, 25 — Default is 15.

When there are two stages of heat available, this is the amount of time the first stage must operate before the second stage can turn on. With heat pumps, longer

times can reduce the amount of auxiliary heat used. Not available with AC thermostats.

Option 18 - Backlight Configuration

Selections:

ON, OF — Default is OF.

When ON is selected and the thermostat is not battery operated a low level continuous display backlight is always on. With OF selected, the backlight is only on for a short time after the door is opened or a key is pressed. Continuous backlight is not available with battery operation.

Option 21 - Keypad Lockout

Selections:

ON, OF — Default is OF.

With OF selected, the keypad cannot be locked. With ON selected the keypad will be locked and can be unlocked by simultaneously pressing the UP and DOWN keys for 5 seconds. Once unlocked, it will relock 2 minutes after the last keypad press. A “lock” icon is displayed while it is locked.

Option 24 - Programmable/Non-Programmable (programmable model only)

Selections:

P, nP — Default is P.

This option is only available on programmable models, allowing programming to be disabled when nP is selected. The clock is displayed, but the program schedule, the HOLD and TEMPORARY HOLD functions are disabled.

Option 25 - Number of Programmable Periods (programmable models only)

Selections:

2, 4 — Default is 4.

Selecting 2 allows 2 programming periods, P1 and P2, per day. Selecting 4 allows periods P1, P2 , P3, and P4. Not available with non-programmable thermostats.

Option 26 - Minimum Cooling Setpoint

Selections:

52°F to 90°F — Default is 52°F.

Sets the lowest cooling setpoint available to the user.

Option 27 - Maximum Heating Setpoint

Selections:

50°F to 88°F — Default is 88°F.

Sets the highest heating setpoint available to the user.

Option 99 - Reset to Factory Defaults

Selection:

See below — There is no default.

Use this capability to reset the thermostat to “out of the box” conditions.

NOTE: All configuration settings, program settings, clock, and day which have been manually entered will be lost!

When this option is selected, the configuration number (99), will appear on the left and 10 will appear on the right. To perform the reset, first use the MODE key to make the 10 flash. Then press and hold the DOWN key. The 10 will start counting down toward zero. If the DOWN key is kept pressed until the count reaches zero, the reset will be performed. If the DOWN key is released early, the number will return to 10 and the reset will not occur.

Step 4 — Check Thermostat Operation

The Legacy Series thermostats have a built-in installer test capability. Use it to check thermostat and equipment operation without delays or setpoint adjustments to force heating or cooling.

To enter the Installer Test mode, use the same process as is used to enter Installer Configuration, only hold the FAN key longer. More specifically, press and hold the FAN for about 15 seconds until the display reads In on the left and St on the right for the programmable model, or InS in the smaller display for the non-programmable model. The MODE will be OFF. The MODE key (upper left) can now be used to select heat, cool, or emergency heat, if this is a HP thermostat. Selecting one of the available modes will immediately command the equipment to turn on in that mode. It will run for 3 minutes and then return the mode to off. With HP thermostats (having 2 stages of heating), the test will run for 3 minutes on each stage. If the thermostat is programmable, the clock display counts down from 180 seconds while each stage operates. Changing the mode to OFF will terminate any running test immediately.

During any test, the display icons will be displayed the same as for normal operation of that stage, as follows:

SELECTED MODE	DISPLAY ICONS
off	off
cool	cool on
heat	heat on, aux heat on
Em Heat	aux heat on

To terminate the Installer Test mode press the DONE or FAN button. If the thermostat is left in Installer Test mode, it will revert back to normal operation after 15 minutes.

Checklist

1. Run equipment through several heating and cooling cycles to ensure proper operation. To operate the thermostat in its normal operating mode, consult the Owner's Manual.
2. If the equipment is to be left in operation, the setpoints, operating mode, and possibly program schedule must be properly selected.
3. Put away tools and instruments and clean up debris.
4. Review and leave Owner's Guide with owner.

FEATURES AND ACCESSORIES

Home, Away, Sleep (programmable models only)

This feature provides three button selections which select from three predetermined pairs of heat and cool setpoints. In programmed versions, one of these three choices can be selected for any programmed period. To change these settings, a temperature is first selected and then the key pressed and held, similar to setting stations on a push-button radio. See Owner's Manual for details.

Clock (programmable models only)

Without batteries the clock will continue to operate for 8 hours while power is removed. With batteries, the clock operates until the end of the battery life.

Batteries

Battery operation is available for installations where there is no common (C) wire available at the thermostat or where operation is to continue while the thermostat is removed from the wall, usually to facilitate remote (armchair) programming. For battery operation, install two alkaline AA batteries. The thermostat is designed to operate up to one year on a set of batteries. A battery indicator on the display warns when battery replacement is needed. See

Homeowners Guide for details. If batteries are installed and the thermostat is operated from 24VAC power, battery operation will occur only when 24VAC power is not present. The changeover between 24VAC power and battery power is automatic.

Display Lighting

The display has two levels of lighting, high level and low level. High level lighting comes on for 10 seconds when the door is opened and/or buttons are being pressed with 24VAC and with batteries. Low level lighting is only available if the thermostat is operated from 24VAC. It is not available with batteries. The low level can be selected (see Option 18) for continuous backlight.

Door Switch

When the door is opened, the display changes from its normal operation view. The large temperature display disappears so it will be available for other user functions. If the door is left open for 3 minutes, the display reverts to normal operation.

Mounting Options

For those installations requiring it, mounting hole locations for the programmable model are spaced to fit either a horizontal or vertical junction box. Mounting hole locations for the non-programmable are spaced to fit a horizontal junction box.

Defrost Operation

In a HP installation with the “O” selection of Option 10, the thermostat allows all defrost cycles to run to completion before turning off the compressor. It does this by sensing a 24VAC signal on the O line which it did not produce. This occurs while the HP is defrosting. As long as this O signal is present, the thermostat will keep the Y output on, even if it is satisfied, thus allowing the defrost cycle to

complete itself. If, through some wiring error or failure in the HP, the signal on the O line remains for longer than 15 minutes, the thermostat ignores it and allows Y to be turned off when it is satisfied.

If the B function is selected (using Option 10), the thermostat cannot sense when a defrost occurs. As a result, it cannot guarantee that defrost cycles will run to completion. If the thermostat becomes satisfied during a defrost, it will turn off the compressor. The HP will then complete its defrost starting with the next cycle.

OPERATIONAL AND CONNECTION INFORMATION

Rc/Rh Connections

For installations having a separate 24VAC transformer for heating and cooling, the R connection can be separated into two connections, one for each transformer. This allows isolation between the two transformers to be preserved. To separate Rc from Rh, remove the factory supplied jumper between the Rc and Rh terminals. The Rh terminal powers the W output. The Rc terminal powers the Y, G and O outputs.

O/B Terminal - On HP Thermostat Only

This terminal is normally connected to the reversing valve of the heat pump. It is called O when the valve is energized in cooling and B when it is energized in heating. Option 10 of the Configuration Options makes the O/B selection.

Timers

There are several timers which influence the thermostat's operation:

If any of the timers listed below is preventing the equipment from turning on, the display icons which show the equipment is operating will be flashing to indicate a turn-on delay is present.

Five-Minute Compressor Timeguard

This timer prevents the compressor from starting unless it has been off for 5 minutes. It can be defeated for one cycle by simultaneously pressing the FAN and UP keys.

Minimum On Timer

Once the equipment has been turned on, it must remain on for 3 minutes. A change in mode or setpoint will cancel this timer.

Cycle Timer

Based on the selection of 2, 4, or 6 cycles per hour, this timer is set to 30, 15, or 10 minutes. This much time must elapse from the start of one cycle before another cycle can start. It serves to impose the cycles per hour limits. It can be defeated for one cycle by simultaneously pressing the FAN and UP keys.

Auto Changeover Timer

To prevent unnecessary cycling between heating and cooling modes, this timer prevents a changeover to the opposite mode until a demand exists in the opposite mode for 20 minutes. It is defeated when setpoints are changed so that the opposite mode is immediately available if desired.

Error Codes

Two error messages indicate problems with the thermostat's operation. If the room temperature sensor fails, the temperature display will show --, two dashes. If there is an internal memory failure, the temperature display will show E4. The remedy for each of these is to replace the thermostat.

Table 1 shows the thermostat outputs for each available stage of heating or cooling. It may be useful in checkout or troubleshooting.

Table 1 – Outputs

EQUIPMENT CONFIGURATION OPTION #1	THERMOSTAT FACTORY CONFIGURATION	COOL STAGE 1	HEAT STAGE 1	HEAT STAGE 2	EM HEAT
AC, PC	AC, HP	Y, G	W	– –	– –
HP, PH RVS = C	HP	Y, G, O/B	Y, G	Y, G, W	W
HP, PH RVS = H	HP	Y,G	Y, G, O/B	Y, G, W, O/B	W

WIRING DIAGRAMS

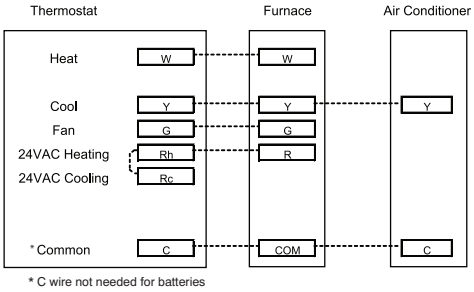

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Fig. 5 - A/C Thermostat Typical Installation

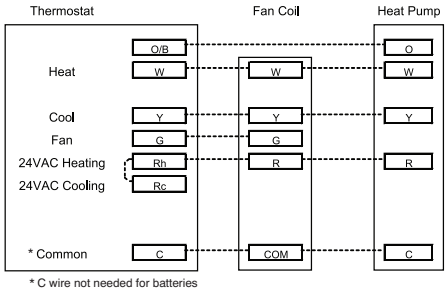

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Fig. 6 - HP Thermostat Typical Installation

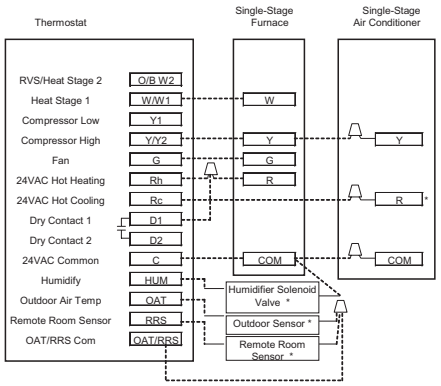

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Fig. 7 - Single-stage Furnace with Air Conditioner and Split Power

* Indicates connection may not be required/available.

NOTE: Rc/Rh jumper is cut on the Equipment Control Module.

THERMOSTAT CONFIGURATION RECORD

Installer _____ Model Number _____ Date _____

A. Hardware Configuration

_____ Seal Hole In Wall

B. Mode Settings

_____ Mode (Off, Heat, Cool, Auto, Em Heat)
_____ Heating Setpoint Value
_____ Cooling Setpoint Value
_____ Fan (Auto or On)

C. Home, Away, Sleep Settings

	Heat	Cool
Home	____	____
Away	____	____
Sleep	____	____

D. Schedule (For Programmable Thermostats)

	Period 1			Period 2			Period 3			Period 4		
	Time	Heat	Cool	Time	Heat	Cool	Time	Heat	Cool	Time	Heat	Cool
All Days	____	____	____	____	____	____	____	____	____	____	____	____
Weekdays	____	____	____	____	____	____	____	____	____	____	____	____
Weekend	____	____	____	____	____	____	____	____	____	____	____	____

E. Configuration Options

Option 01	____	Equipment Type
Option 03*	____	Fahrenheit/Centigrade Selection
Option 04	____	Fan (G) on with W/W1 Selection
Option 07	____	Zoning
Option 10	____	Reversing Valve
Option 11	____	Minimum Deadband Between Heating and Cooling Setpoints
Option 12	____	Smart Recovery (programmable models only)
Option 13	____	Room Air Temperature Offset Adjustment
Option 15	____	Auto Changeover Availability
Option 16	____	Cycles Per Hour
Option 17	____	Time Between Equipment Stages
Option 18*	____	Backlight Configuration
Option 21*	____	Keypad Lockout
Option 24*	____	Programmable / Non–Programmable (programmable models only)
Option 25*	____	Number of Programmable Periods Per Day (programmable models only)
Option 26	____	Minimum Cooling Setpoint
Option 27	____	Maximum Heating Setpoint

* Options with an asterisk can also be set/changed by the homeowner.

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